CLAIMS

We claim:

1. An electronic device comprising:

a phase change material;

a first terminal in electrical communication with said phase change material;

a second terminal in electrical communication with said phase change material;

a third terminal in electrical communication with said phase change material;

wherein the electrical resistance measured between said first and second terminals differs from the electrical resistance measured between said first and third terminals.

2. The device of claim 1, wherein said phase change material is a chalcogenide material.

3. The device of claim 1, wherein said phase change material is reversibly transformable between a crystalline phase and an amorphous phase, said crystalline phase and said amorphous phase having different electrical resistances.

4. The device of claim 1, wherein said phase change material comprises S, Se, or Te.

5. The device of claim 4, wherein said phase change material further comprises Ge or Sb.

6. The device of claim 4, wherein said phase change material further comprises As or Si.

7. The device of claim 4, wherein said phase change material further comprises an element selected from the group consisting of Al, In, Bi, Pb, Sn, P, and O.

8. The device of claim 1, wherein said difference in measured electrical resistances is at least a factor of two.

9. The device of claim 1, wherein said difference in measured electrical resistances is at least an order of magnitude.

10. The device of claim 1, wherein said measured electrical resistance between said first and second terminals differs from the electrical resistance measured between said second and third terminals.

11. The device of claim 1, wherein said device is a logic device.

12. The device of claim 11, wherein said logic device is an OR device.

13. The device of claim 11, wherein said logic device is an AND device.

14. The device of claim 1, wherein said phase change material includes a crystalline region and an amorphous region.

15. The device of claim 1, wherein said phase change material includes an amorphous region that resistively shields one of said terminals.

16. The device of claim 15, wherein said resistively shielding amorphous region is in physical contact with said resistively shielded terminal.

17. The device of claim 16, wherein said resistively shielding amorphous region substantially covers said resistively shielded terminal.

18. The device of claim 1, wherein said phase change material includes a continuous crystalline pathway between at least one pair of said terminals.

19. A method of operating an electronic device, said device comprising a phase change material and three or more terminals in electrical communication therewith, said method comprising the steps of:

applying a first signal between a first pair of said terminals of said device; and

applying a second signal between a second pair of said terminals of said device.

20. The method of claim 19, wherein one of said first and second signals is an amorphizing signal.

21. The method of claim 20, wherein said amorphizing signal forms a resistively shielding amorphous region.

22. The method of claim 19, wherein one of said first and second signals is a crystallizing signal.

23. The method of claim 22, wherein said crystallizing signal removes a resistively shielding amorphous region.

24. The method of claim 19, wherein said first and second signals are electrical signals.

25. The method of claim 24 wherein said electrical signals are current pulses.

26. The method of claim 19, wherein said first signal modifies the resistance measured between said first pair of terminals.

27. The method of claim 26, wherein said first signal does not substantially change the resistance measured between said second pair of terminals.

28. The method of claim 26, wherein said second signal modifies the resistance measured between said second pair of terminals.

29. The method of claim 19, further comprising the step of measuring the resistance between a third pair of said terminals.

30. The method of claim 19, further comprising the step of measuring the current between a third pair of said terminals.